NATURAL RESOURCES POLICY CONSULTATIVE GROUP FOR AFRICA

A joint initiative of the U.S. Agency for International Development & World Resources Institute

Policy Brief #2 September 1995

Links between Environment and Agriculture in Africa

Implications for Economic Growth and Policy

by Thomas Reardon and Asif Shaikh

In much of Africa, population pressure is growing, the arable land frontier is shrinking, and farmland, pasturelands, and forests are being degraded. There is a tug-of-war between the need to protect lands currently outside of agriculture--biodiverse forests, bushlands, and grazing areas important to the food security of agro-pastoralists--and the need to increase agricultural output rapidly to meet burgeoning demand for food and fiber and to fuel economic growth in economies driven mainly by growth in agriculture and natural resources.

Demands for food and economic growth are driven by growing populations and the need to alleviate desperate poverty. For three decades, Africa's population growth rates have been the world's highest. With the mainly traditional low-input technologies now in use, current populations are already too big to feed, and population will double in the next generation. Food output must grow at 3 to 4 percent per year just to feed this population--let alone generate a surplus to fuel economic growth.

The broader African context is also changing rapidly. Urban and rural markets are developing quickly as population density increases, trade in goods and labor (migration) is growing, economic liberalization and democratization are taking hold in many countries, and an acute energy shortage is developing. These changes influence market signals at all levels--and are already altering how households think about agriculture and the environment and how they make a living.

The sum of these changes gets to the heart of Africa's strategies for economic growth and development. African economies must "reverse the spiral" (to use the World Bank's phrase) in order to succeed. Positive links in environment and agriculture can stimulate economic growth. At the same time, more broad-based growth policies are needed to lay the groundwork for productivity increases in resource use. Economic growth is also essential. To gradually reduce dependence on the natural resources base for income and employment, such growth can be spurred through alternative income generation, increased trade and market opportunities, and long-term reductions in population growth rates.

The issue then becomes how the African environment--on-farm and off-farm--can be protected and sustained even as agriculture grows rapidly enough to meet urgent needs for food and economic growth. This issue bears on the broad strategic planning of government ministries, donors, and NGOs and also on practical program design. How can environmental programs be designed so as not to dampen agricultural

growth? How can the agricultural development program be designed to help sustain the quality of the soil base that is so essential for farm output growth and also minimize invasion and destruction of the commons?

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I. Agriculture's Effect on the Environment

Increased farm productivity and agricultural growth, with concomitant increases in food availability and incomes, help the environment now and over the long run. Sustainably intensifying production on the land currently cultivated will reduce pressure on poor farmers to push onto fragile margin land and to rely on labor-intensive gathering strategies off-farm in the biodiversity-rich commons. More specifically, poor farmers who cannot produce enough food on their land practice "extensification"--extending cropping onto marginal land and the commons (forests, wetlands, bushlands, hillsides). This degrades fragile soils, setting up a cycle of further impoverishment--a vicious circle. Research carried out by Michigan State University (MSU) in Rwanda, for example, shows that farmers have been pushing down fragile hillsides, creating erosion. Poor households also rely on the products of the commons for survival. There, the poor gather every stick that can pass for fuelwood and there they overstock livestock to insure their livelihoods. Richer households also draw on the commons, pursuing livestock husbandry on wild lands or harvesting trees. Often, these activities have an even greater absolute effect because this economic group usually has larger herds and better tools to harvest wild products--chain-saws and guns, not just machetes.

But, in many places, the days of "extensification" are ending as open areas available to expand farming disappear. Many poor farmers in these areas turn to "labor-led intensification"--farming more on the same land. They reduce fallow periods, plant seeds more densely, push the land harder. But few can afford to offset this mining of the soil by applying fertilizer and manure to protect soil fertility and prevent soil exhaustion. Extracting more without giving more back is one of the most important environmental issues in Africa--and at the backbone of the agricultural crisis. International Resources Group (IRG) analyses in the Sahel, conducted with the Center for Agrobiological Research in Holland, found that current production is being maintained by progressively depleting soil nutrients. MSU research with the Senegalese Agricultural Research Institute shows that in Senegal, increasing peanut seeding density without applying manure and fertilizer is rapidly leading to soil exhaustion.

In Africa, agricultural pollution is not at all the problem that it is in some parts of Asia or in North America or Europe. Fertilizer, pesticide, and even manure use is extremely low in Africa. Even a 10-fold increase in use would not create serious chemical-runoff problems. On the contrary, the big problem is using too little fertilizer and manure--which undermines sustainable intensification and forces farmers to

seek new lands to clear. For this reason, not intensifying agriculture will undermine farmlands and the commons in the medium to long run--and will mean that food needs go unmet. Low-input agriculture, which typically allows growth of 1 percent a year, cannot meet demand growing at 3 to 4 percent a year. The land frontier is closing, making intensification--growing more on the same surface area--a critical agricultural and environmental goal.

Cropping intensification need not be the enemy of the environment, however. Intensification can be accomplished in a way that meets food and fiber supply goals and helps the environment on-farm and off. In "capital-led intensification," farmers crop more intensively but offset harmful effects on soil fertility by enhancing the soil with fertilizer, manure, or compost and protecting it with bunds, terraces, and windbreaks. This approach checks degradation and can enhance the on-farm environment.

Evidence indicates that intensifying farmland use can also protect the commons. Derek Tribe of the Crawford Fund for International Agricultural Research speculates that had there been no Green Revolution in India, 44 million hectares of land currently under forest would now be plowed and farmed.

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II. Environment's Effect on Agriculture

Protecting the natural resource base is crucial to economic growth in most of Africa, where most of the population depends on the land, water, and forests for a living. Degradation of farmlands and forests undermines the national economies in every agro-ecological zone while desertification undermines the fragile lands of the Sahel. Protecting farmlands is crucial to farm productivity, and protecting the commons is crucial to maintaining biodiversity and to the survival of poor households.

Soil-conservation measures have a large positive effect on agricultural productivity. Hence, soil degradation undermines the food security of households and regions by undermining farm productivity and food and fiber output growth. In areas with fragile environments, this holds for the short as well as the long run. IRG's work in the Sahel shows that improved natural resource management (NRM) practices can double yields for up to two decades. MSU research with the Ministry of Agriculture in Rwanda shows that poor smallholders who take this approach in moderately to heavily degraded areas get yields 30 to 40 percent lower than those in non-degraded areas--a big difference at the margin of hunger and poverty. Redressing erosion through soil-conservation investments increased yields by 25 to 30 percent in these same areas.

Biodiversity in the commons--not just species-rich forests, but in the savannahs and wetlands as well--is an important resource for medicines and tourism. Just as important, it serves as a species pool for improving cropping and animal husbandry. Protecting these areas will be quite difficult if farmers in the surrounding areas do not benefit from such schemes. Often the benefits to them appear to be well below the costs, which exacerbates poverty in those areas. In such cases, management schemes are slowly undermined by this clash with the local population's food security goals. A critical program issue, then, is how to link such programs with agricultural development, tourism promotion, and the sharing of benefits in a broad area near the protected zones.

The battles to protect the forests of Madagascar, the Cameroons, and Zaire will be won or lost well away from the forests themselves--in the agricultural lands. As farmlands expand to meet the desperate needs of rural people, they squeeze the areas near forests and eventually put pressure on the forests themselves. "Integrated conservation development programs" have been useful in that they address the "buffer zones" next to protected areas, but they do not go far enough because they do not bring agricultural lands squarely into the center of the environmental debate.

The degradation of commons and open-access areas can also undermine off-farm income strategies that rely on gathering local flora and fauna and fuelwood and on livestock husbandry. Often, the poorest people depend most on the commons since the economic activities undertaken there have low entry barriers and can be started with meager means. Improved pastures and commons are needed for animals that are a critical source of cash for the farm capital and manure needed for intensification. Degraded environments can also undermine health--increased time spent by mothers searching for cooking fuel means less time for household maintenance, and erosion and silting can ruin clean water sources.

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III. Strategic Implications

There is a strong link between the environmental and the agricultural development agendas. Indeed, one cannot survive without the other. Program links between sectors--for example, livestock-husbandry promotion as part of agribusiness programs--can help in areas that need manure for soil enhancement, and balance in resource allocation in programs is crucial. Neither the environmental nor the agricultural pressures in Africa can be addressed in mutual isolation.

Large numbers of rural people are already changing production techniques away from traditional low-input systems--in order to survive. But that change can be toward or away from sustainability. The least sustainable path--labor-led intensification--leads to soil exhaustion and the destruction of the commons. Unfortunately, ample evidence indicates that this is the path most commonly taken at present. The other path--sustainable intensification--focusses on maintaining soil fertility and protecting soils through improved NRM, including conservation investments and improved practices.

If sustainable intensification is to succeed, the decline of agricultural support services in Africa needs to be reversed. Specifically, large increases in the use of fertilizer, seed, and animal traction are needed in conjunction with soil-conservation investments (in bunds, alley cropping, terraces, etc.) and organic matter application (composting, mulch, manure). This double strategy is at the heart of sustainable intensification. In turn, these investments build capital on the land and a key transition occurs--natural resource capital becomes financial capital.

If the agriculture agenda is to serve its own and the environment's needs, it must thus be focussed on sustainable intensification in the more favorable agro-climatic zones--on growing much more on the same good land. In this setting, input use is not an environmental problem. In fact, herein lies a hope: closing the huge gap between current and potential yields by investing more in soil-fertility inputs and conservation will mean that Africa's people and environment will both be far better off than they are now.

Investment can also bring back into production the more fragile land in less favorable agro-climatic zones that has been rendered unproductive by overgrazing and overcropping. Rapidly increasing yields in these zones is likely to remain difficult, but soil conservation, alternative income sources (to reduce stress on land), and modest sustainable increases in productivity based on the low use of external inputs

are the keys. In particular, growth in alternative income opportunities is essential to relieve pressure on resources and rural production in the medium to long term. Promoting rural-urban market and employment links will contribute to this growth.

Policy and programs have an important role, both in helping rural people manage their commons and in helping farmers along the path of change that leads to sustainable intensification. Policies that reduce fertilizer tariffs, along with public investments in transportation that lower the cost of and increase farmers' access to fertilizer and seed, will help. So will linking requirements for soil conservation investments with programs that increase access to fertilizer equipment.

The intensification of cropping alone cannot, however, guarantee the inviolability of biodiverse wildlands. Access to some protected areas must be restricted too. The local acceptance and practicability of such restrictions will depend on policies and programs that make rural people at least as well off with the restrictions as before them. (Currently, this net-gain approach is often not taken.) Alternative income sources need to be major and sustainable since the poorest typically rely most on protected areas for food security and fuelwood.

Reforms in land- and resource-tenure regimes will be important in efforts to give local communities the means and the incentives to make land improvements and to intensify production on their own lands instead of pushing into the commons. Complementary public infrastructure is also essential to promoting income alternatives to over-using the commons. Making private investments in soil enhancement and conservation--such as wells and culverts, or trucks to move rocks for bunds affordable and attractive--is another key. And innovative ways to finance and administer such investments top the agenda in this era of restricted budgets.

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